**STEM careers podcast series – Neuroscientist**

**Dr Nela Durisic**

*Dr Nela Durisic is a neuroscientist at the Queensland Brain Institute. She has worked as a scientist in the US, Canada, Spain and Australia. Nela is using physics principles to answer biological questions such as how neurons in a healthy brain communicate and how that communication is disrupted in genetic epilepsies.  She is studying the movement of single molecules in live brain cells by combining cutting edge microscopy methods, including super-resolution imaging, with state-of-the-art molecular biology tools and electrophysiology. Her research aims to enable precision-based therapeutic strategies for people with genetic epilepsies which are also free from the side effects seen with currently available therapies. For her work, Nela has been awarded several academic prizes, fellowships and research grants, and she has secured almost $1 million in research funding.*

**Announcer**:

This is the Queensland Department of Education Podcast.

**Virginia Bowdidge:**

The careers that fall under the STEM, science, technology, engineering and mathematics umbrella, are many and varied. In this podcast series, we talk to professionals working in some of these careers.

Hi, my name is Virginia Bowdidge and I'm from the Department of Education and with me is Dr Nela Durisic, neuroscientist and biophysicist at the Queensland Brain Institute. Dr Durisic, thanks for joining me today to talk about your career and STEM education.

**Dr Nela Durisic:**

Thank you for having me and please call me Nela.

**Virginia Bowdidge:**

Nela, I understand your area of interest is biophysics. Could you explain what biophysics is?

**Dr Nela Durisic:**

I was studying physics in my undergrad, but I have always been interested in biology mainly because of the complexity that biology brings. So I wanted to apply physics on biology. Essentially it's applying physics principles and trying to answer biological questions.

**Virginia Bowdidge:**

So what first sparked your interest in STEM and in particular, what sparked your interest in biophysics?

**Dr Nela Durisic:**

I had many people who inspired me through my life, so more than one role model. But I guess it helped that my family was not really a typical one. My mom was a civil engineer and dad in food industry and that sort of helped me feel like it doesn't really matter if I like to study engineering or physics. I never thought about my gender in relation to the profession that I would have.

I have always been curious by nature and also quite artistic in many ways. So at first my parents thought that I would be studying fine arts and I was actually preparing my entrance exam for fine arts. However, physics and math has always been present in my life. I enjoy them a lot. I was very good at them. A lot of the credit I would give to my high school physics teacher who was very approachable, very inspiring, and he sort of made us see physics principle everywhere in our life, everywhere around us, and also help us apply those. It was a pleasure. So I never really thought about it as my future profession. It was the day when I was going for an entrance exam, physics building and fine arts building at the university were sort of across each other. And the exam was at the same time. Instead of going in to fine arts building, the last minute I went into physics building. I did really well, and that's how it all started. I never regretted it.

**Virginia Bowdidge:**

So it really was a very impulsive decision, do you think?

**Dr Nela Durisic:**

In a way it was an impulsive decision, however, I think that everything led to it, my really good background, strong math, strong physics, strong biology also, and the ease of doing these things. The curiosity level I had, the side of me that was very creative that thought that I should find my place in fine arts. But from this perspective, I have to say that my creativity came into play so many times. And I have fulfilled that side of my personality fully in science. I think that this is something that many people forget about and think about science as more a lot of learning and something that can be challenging at times, but science has such a creative side to it and it can be very, very enjoyable just for that.

**Virginia Bowdidge:**

Many people without a science background wouldn't realize that is the case.

**Dr Nela Durisic:**

I guess many people don't realize that because they don't have an opportunity to show their creativity. Once you start working in the lab or have some involvement in experiments, then you realise that you can influence that system any way you want. And this is where the first signs of creativity begin. Then as you progress, as you learn more and you get to the forefront of knowledge in the area where no one has ever been, and you start seeing things that no one had ever seen, then you start to ask questions, whether I want to do this, or I want to do that. And that is exactly what creativity is.

The outcomes of it will always lead you in a direction that appeals to you, that in a way is very significant because you have all the responsibility that you're doing it, but you're studying the world around you and how that world functions. On that path, there is a lot of your input that can be very artistic and very similar to what artists do when they study your portrait or when they study the nature around them, putting that vision that they have on the canvas.

**Virginia Bowdidge:**

What does a typical day at the QBI look like for you?

**Dr Nela Durisic:**

Very rarely two days are the same. If you're someone who likes routine, you can make it so that there is routine to it. But if that's not necessarily what you aim for, then yes, you can have every day being different. Some days I take care of animals. Other days I go to the lab and I prepare samples, cells. There are days when I would spend the whole day in front of the microscope looking for single proteins moving around and actually being able to see that world of proteins interacting with each other and sort of creating life right in front of my eyes.

And then other days I would start writing articles, a summary of what we've done over past few months. And then there's also time when we apply for funding many times so that we write grants and scientific proposals. I see that sort of as daydreaming in a way. We have a good knowledge of what is going on in the field. And then we also know where we want to be a year or two from now. What are the important questions that we want to answer? Then when you start putting all that on the paper, you start predicting the outcomes of the research. And in a lot of ways, that's like daydreaming, but daydreaming with a purpose that really pays off.

**Virginia Bowdidge:**

That's a wonderful way of looking at it.

**Dr Nela Durisic:**

Thank you.

**Virginia Bowdidge:**

What is your current research focused on?

**Dr Nela Durisic:**

I'm working as a neuroscientist in Queensland Brain Institute. I'm specialised in super-resolution microscopy and combination actually also resolution microscopy and electrophysiology. So I will explain a little bit what is super resolution microscopy and what is electrophysiology. Essentially with a regular microscope, we can see things much better than with a naked eye. However, we are limited by properties of light. And in the last 10 years, we found a way to bypass the limiting properties of light and actually go down to a single protein level. And this is what I do. I use physics principles to bypass limiting properties, properties of light, and then look at the movement of single protein. I study brain cells, so neurons, and I look at one of the receptors in neurons, and I look at what it does, how it interacts with other proteins and how that affects brain function. A disease that I am interested in is epilepsy. So then I compare how certain proteins function in a healthy brain as opposed to in a brain where there's epilepsy caused by genetic mutations, genetic changes, basically.

**Virginia Bowdidge:**

What is it about your career that motivates or inspires you?

**Dr Nela Durisic:**

I find so many things motivating. Science, first of all, is a way of discovering what the universe is, how it works now and how it worked before and how it's going to work in the future. So that's the physicist in me talking. But then once you start applying that in other fields, be it engineering or biology, where I am applying it, you start to see similar principles. And you start to see things that no one has seen before. And this is what I find so amazing, that process of discovery is really thrilling. There is no redundancy in my work. If I want to repeat something, it is because I want to make sure that this is exactly what is happening every time, because these are scientific principles are such that with the same conditions you have the same things happen over and over again. So this is checking for consistency, but the novelty of things that we see and then interpretation of those and making sense of why things are the way they are, I find that very, very exciting and also very rewarding.

**Virginia Bowdidge:**

So what has been the highlight of your career to date? I know you probably have more than one.

**Dr Nela Durisic:**

I guess, for all of us, being able to publish in high impact journals and securing funding, these are really important. But actually I would like to talk about more personal achievements that mean something to me. I have two publications that are published in very good journals. The idea for them happened in a bar. So during my PhD, a few of us went out and we were talking about everything. And then with a colleague, we kind of touched on experiment that we were doing. And one thing led to another, we were bouncing back ideas and we came up with something that we really wanted to try. And this is what we did in our spare time.

So I worked on my project that was my PhD project. And he worked on his, but then we would meet after in the evenings, stay in the lab and try things out. And out of that we got two very, very good publications. So for me, that process of having a like-minded person next to you, and then creating something together was a really wonderful thing that was very rewarding.

I guess another one would be, I gave a talk once and a Nobel Prize winner came to me and thanked me for the study I've done and asked me to work for him.

**Virginia Bowdidge:**

Wow. That's very impressive.

**Dr. Nela Durisic:**

I had other obligations, so I declined. But I found that quite flattering.

**Virginia Bowdidge:**

What advice do you have for high school students interested in a career in STEM?

**Dr Nela Durisic:**

In one sentence, it would be follow your dreams. And I know that's a cliche, but I find that when we think about what interests us and where we want to be, we also start being aware of many stumbling blocks and then we think, oh, maybe this is not the best or this would be limiting and all that. I think you should not think about these things. Just do what your heart tells you. And you'll find a way to get there.

There are many ways to get involved in science if you're interested in. At QBI, for example, we have a Brain Bee Challenge, which I think is one of the most popular ones. We always welcome people to come and talk to us. And I think the more you know something, the more you have a chance to love it. So I think getting involved early is actually quite important. And maybe you will start doing something and realise that that's not exactly what you want. Or maybe you will start doing something and realise that you love it. And that you want to be involved more. And if you are there, for sure, we will find a place for you.

I would really like to encourage young people to come and talk to us or get involved. As I said, there are many assumptions made about what working in science really is, but I think until you go in the lab, until you see what the project really looks like, then you don't quite know what kind of life that is.

**Virginia Bowdidge:**

Thank you very much for your time.

**Dr Nela Durisic:**

Thank you.

**Announcer:**

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