

TRANSCRIPT: Radio Adelaide Interview with Dr Naomi Hunter
Niki Sperou + Peng Su
22 June 2020

HUNTER: And we have a jam-packed show today. Joining us in the studio we have ANAT's 2020 Synapse Artist in Residence, Niki Sperou, and bio technologist Peng Su joins us, to talk about a project, I think this might be a working title, 'Green Plastic – Blue Ocean'.

SPEROU: Yes, it is a working title. Well spotted.

HUNTER: *(laughs)* Well, welcome to the Studio.

SU: We're working on it very hard. *(All laughs)*

HUNTER: So, tell us a little bit about your ideas, about your proposal, to the Synapse residency in the beginning.

SPEROU: OK, so art should be about things that influence society today, and one of the big challenges of today is the plastics problem. And you might look around you and you can see that plastic is a ubiquitous and really important resource that we use but it comes at a price. So, this price is, that because it's so well made, it hangs around for a long time, well past it's use-by date, well the use-by date in which it's useful for us. So, what happens with it? And, unfortunately, it's usually an out-of-sight, out-of-mind problem, but it's become such a problem these days, that we can no longer ignore it, and, as it breaks down, we also now have a micro-plastics problem which people weren't aware of before. So, every time you wash your nylon clothing, or you discard the drink bottle, or now with the Covid crisis, you get rid of your mask, or your rubber gloves, they're ending up somewhere. So something that you may have used only for 5 minutes is going to hang around for a long time, and micro-plastics can end up in waterways, in the fish that we eat, and then they can disrupt the way our body works, even though the science on that is out on the moment, we do feel that it is something that will impact our health.

HUNTER: Interesting. So, I mean, I think we've all been aware of this change in the level of consciousness that we have around our effect on the earth and the earth's effect on us. So, I know that you are looking at using seaweed. And I, when I was talking to Vicki Sowry from ANAT, we were talking about, you know, that it was actually quite poetic that you are looking in the place that is actually being most effected for perhaps a way of replacing those long-term plastics with something that is functional but then isn't going to have that dire consequence afterwards. How did you even fall into the rabbit hole of looking at plastics?

SPEROU: OK I was doing some work last (year), um, in 2016¹ with the Centre for Marine Bio-Products Development, and I was working with locally sourced seaweed from Beachport in South Australia, and I was aware that other people in my lab, Peng, who's with us today was working with marine derived, well, marine algae derived ingredients for different applications for science and industry. And one of the interests of Peng was bio-plastics, I think you gave a little talk?

SU: Yep. Actually, it was a long talk. *(All laugh)*

SPEROU: And I thought to myself, that's something that interests me because I'm interested in ideas of the Anthropocene and I thought we would make a great team. So, I applied to ANAT so that we could work towards this project together in collaboration.

SU: Yes, definitely. Because actually, the thing is we've been working on seaweed from South Australia for eight years, which is long time already, before it was mainly about food, so supply the food crisis globally, but recently in the last couple of years we realising, I mean the food

¹ Later corrected to 2018

product's still going, like, see, the micro-plastic that Niki mentioned has really, really become something people should pay more attention on it, because normally science, in science industry or science area, scientists realise things a little bit earlier than the public, and so we see definitely there is a big problem, it will be problem, and as we start utilising the seaweed to make material we can use to replace part of the plastic we're having every day. Simply, we have lots of seaweed in South Australia, the problem is too much. They get rotted, they stink, this a big problem. And now we try to collect them before they get rotted and stink, causing more problem to the environment, we use it. We call it 'user friendly material', that's not limited to human, I think that is very, very critical because before the term of user friendly is all about customer, who pays for that? But we're going to pay for everything, eventually. In the future, we're going to pay for all the damage we did, right? So, the 'user friendly' for us in our area is more actually to everything, to the shark, to turtles, to dolphins, to fish, to the sea...

HUNTER: Yeah.

SU: ... to the birds, to everyone. So, that's eventually where we come up, and also, I'm from 100% science background and my job actually is take the science and translate it into engineering, so science is knowledge, engineering's a tool, right? And then category is Art which we're having stuff every day, right? And then we're being spurred by Niki so much, she said, she said you can, make that, that, that, that... really? And then we did it! (*laughs*) That's how we started, yes.

SPEROU: So, we always say 'two brains are better than one'...

HUNTER: Yeah (*laughs*)

SU: Yep

SPEROU: ...and we're like our own mini-think tank so we can take our diverse experience and bring it together in this project and the interesting thing about the seaweed that we're using, it's actually seaweed that has been washed to shore, so...

HUNTER: It's red seaweed, isn't it? It's a red seaweed that you're using?

SPEROU: Ah, we're using mainly...

SU: Using mainly brown.

HUNTER: Brown, right.

SPEROU: ...brown. Yeah, the greater bio-mass is the brown...

SPEROU: We actually have more varieties of the red seaweed but the greatest amount, accumulated amount is in the brown seaweed and that's what we work with the most. And, I think it's really important that currently we're working with seaweed that's washed to the shore, so we haven't actually touched anything from the sea bed, and this seaweed washes up into wracks at Beachport, and it's highly monitored by Government, so that people just don't take it away willy nilly and that all the correct environmental protection is in place.

HUNTER: So, when you say "collect seaweed and within the limits", are we talking about, you know, a bucket of seaweed, a tonne of seaweed, like, how much do you need for the experiments that you might be doing?

SU: Alright, for the laboratories we need about six full kilos to actually to complete most of the tests, and for the prototype material like we've been making with Niki through this project, actually, I think we've only used about the maximum (of) a kilo at the moment, but we've made so many amazing products, prototypes already. But, for the industry scales obviously depends on the

requirements, but in South Australia alone, like, down to Beachport, every year we have millions of tonnes of beach cast seaweed naturally being deposit on the beach, it's just a gift from the nature. It's up to you whether you want to take it or not. *(laughs)*

HUNTER: So, what is it as well about the seaweed's DNA, if you will, that makes it malleable to turn into another product?

SU: Yeah I think that is, I guess it's just, that's why I said that's a gift from the nature because I personally believe first of all a scientist is not really creating anything, we discover, and then we use it in a natural way, but more sort of, say, practical ways because when nature first designed it, there was no human, *(laughs)* right? and now we still discover from it... to be honest *(inaudible)* I think when it's like, see, just imagine the forest, like, because the timber industry in South Australia, right, is all those commercial forests. Everybody knows what those trees gonna end up with; furniture, chopsticks, you know, toilet paper, and some sort of stuff. Seaweed's the same, there's a forest under the sea. That's why I said if you look at it the *(inaudible)* forest under the sea is so much, it's enormous, it's much bigger than any forest you can see on land, and though the seaweed has natural property of against all the gigantic waves of the sea, but the tree on land only by the wind! So, the level of force and the strength is not at same level, you know what I mean, and also water pressure and everything, and it's like in the nutrients. Seaweed's flexible, it's like leather, and also, it's made full of carbs, I mean carbohydrates, and it's biodegradable, and also it grows naturally so big. And it's just waiting there for us, to take it *(laughs)*.

SPEROU: And it, it captures carbon, too, which is good for the atmosphere.

SU: Yeah, yes, and also in the Co2 cycle of the earth seaweed can fix lots of carbon CO2 in land, it's a carbon sink as well, so, like the tree.

HUNTER: So, do you have a rough estimate at the moment if you were to make a certain product out of seaweed, how long would it take for it to become, you know, biodegradable?

SU: Oh!

SPEROU: Depends.

HUNTER: *laughs*

SU: Yes. Very scientific *(laughs)*

SPEROU: We were talking about that this morning, that when we're designing a product it has to be fit for purpose. So, if something is, is going to be a single use, for instance, a mask, we're going to use that for maybe four hours, and then we don't want it hanging around, for years, so we want to build into that a time frame for it to break down which is sort of according to its use. If we're needing a plastic that's going to remain in use for a longer period, then of course we want the biodegradability to be delayed as well.

HUNTER: Because the last thing I suppose you want to do is go to the cupboard, pull out your mask to put it on and it's already degraded...

SPEROU: Exactly.

HUNTER: ...before you've got to use it.

SU: Yeah.

HUNTER: I know that's happened to me before with the biodegradable bags that you use for your green bins if you're putting your food scraps in there. Like, I've opened the bag up and the bottom of it's starting to perish already and it's like 'oh, I haven't even got to use it yet'. So, at least I know that it is compostable, it's not just degradable, because, compostable means it gets broken right down but I think degradable just means that it gets smaller and smaller but it's still...

SPEROU: It's ... when it's truly biodegradable it completes the carbon cycle. So, it goes back into the elements, basic elements of carbon.

SU: Yeah, Co2.

HUNTER: Yeah.

SPEROU: So, it's no longer a plastic and it's returned into a basic raw material that that makes up the earth.

HUNTER: So, if someone was concerned, just as an aside, and they were looking at the packaging, what is the thing that we're looking for? We want it to say biodegradable, or we want it to say compostable on there?

SU: Yeah, I think (it) really depends on, first depends on which country you're from. Like, in Australia, there's a lot, my understanding is the industry composting plant still not really that, you know, covered whole nationally, and so the biodegradable is, I'm not saying that it's better, it really depends on how you look at the recycling process. The biodegradable is recycling by nature itself, so you put on the ground, in the landfill or whatever, then the nature will just take it in, put it back in to the big cycle, but the compostable, somehow then require industry compost process, and the can be taken in by the nature, so it can take one extra steps, but really as Niki said it depends on the applications, because so far according to technology, so far, and also the cost, obviously is very important, is... not at all everything had been made 100% biodegradable or compostable, because, you know, it had to be affordable, you know, that the use of it, everything had to be taken into consideration, and also depends on the... really depend on recycling industry of the country. Australia doing very, very well, and then so, I don't think there's much problem in Australia as it goes, but obviously somewhere else in the world might still need to catch up. That's it.

HUNTER: Yeah. So how far into your residency are you, Niki?

SPEROU: Peng and I started working together in March, and I will be at Centre of Marine Bio-Products Development until October.

HUNTER: Awesome, so you've still got a little time to go. And, have you found that you are still on your original pathway that you began at the beginning of the research project, or has it already deviated?

SPEROU: I think the great thing about a Synapse residency is that the investigation is more important than the output at this stage. So, they leave it quite wide open, and it's kind of wait-and-see scenario, they're quite happy with that, and that really does allow for research to be open ended, rather than locked up from the beginning. And Peng found that really quite strange as a scientist, he says "we don't work like that". He says, "we would never get any money if we worked like that. We have to put out a proposal from the start and we have to adhere to that quite closely". But I said, "How do you come up with creative discoveries? How do you open new questions? You know, how do you go down different pathways?" Well the great thing about having a residency like this is that we can follow those pathways, and we can go to undetermined places, initially, and then we wind it, we tighten it later. So, we go from quite an open, ah, open pathway, and then we narrow it once we find directions of interest.

- HUNTER: Peng, how are you finding that, working in that different way? Are you finding it a little bit of a relief in one way, or are you finding it a little bit... you would be used to having sort of quite strict timelines...?
- SU: Yeah, actually I can say this is correct. Absolutely correct! *(All laughs)*
- SU: It's actually, well, I've been working in the science area especially in the research laboratory for ten years. It's actually the first time I can work and talk to people. Which is great, very... it may sound not important but actually it's very important. Like, I 100% agree with Niki, it's like science... specifically now the science projects is more very, see, outcome driven, so we have to give a hypothesis, basically a predicted outcome, for the investment of the research meaningful² ... but, science is as I said is a discovery process – sometimes we discover a positive result which is profitable, some time we discover not a result which is loss. But is good discovery anyway. But, working on this project is like, we never move away from our big pictures, like make user friendly, environmentally user-friendly material, and always having that big picture of carbon cycles in our thinking. Like, for example seaweed, we take seaweed from the beach, we process it, we research on it, process it, make handbags, or sorry masks, right, people use the masks, they dump it in the bin, and those rubbish is more likely end up in the landfill. From landfill it start (to) degrade, biodegradable, become you know, small pieces, end up in underground water and its flood to the ocean and eaten by the turtle. It's ok. The turtle just like eat another piece of seaweed. OK, the cycle is complete. That is pretty much our principles, but in terms of, in terms of details and the methodologies, whatever, we'll go as the discovery which is the best of the best! *(laughs)* Because as a scientist that is always my dream, because science is about discovery. I discover every day, I make a thinking based on my new discovery, and then move ahead bit by bit. It's very enjoyable, and also, you know, talking to people is very nice *(laughs)*.
- HUNTER: Having a bit of space to breathe and think outside the standard, you know, this is the process: step one, two, three. Now it's like "well there's step A, Z, move to the left..."
- SU: Yeah, I was talking to Niki about it actually, I had a very strict training about scientific thinking, and implements, scientific methodologies, so over the year I have a tunnel vision, my tunnel vision, my tunnel is very narrow.
- HUNTER: Yeah.
- SU: Like, see, so, I have one hypothesis, a problem, I solve that - that is the result I want. OK. I'm never thinking it's anything else, outside, but with Niki on board, she was taking me out of the tunnel. "Come out". You squeezed! *(laughs)*
- SPEROU: I always said, "Peng, get out of your box" *(All laugh)*
- HUNTER: Well it is interesting, because you know when you specialise in something, it is very focussed, so your focussed on a particular issue, in a particular methodology and it's, you know, now you've got the opportunity to sort of glance around at other things to see the relationships that are happening...
- SU: Definitely
- HUNTER: ... and expanding that focus, so it's not just so micro. I think it's amazing.
- HOST 2: And I guess it's broadening the scope, in the sense of today it is masks, tomorrow it could be any type of plastic product that you could substitute.
- SPEROU: That's right. We can bring our personal interests into the project. Yeah.

² *(in terms of dollar values)*

SU: Yeah, so we do face masks for the Covid, or the virus, anti-virus. We do beauty masks too, we can use all the nutrients, and also, we can do wound dressing for the burn areas.

HUNTER: I did see that.

HOST 2: Wow.

SU: And then so handbags, you know, textural material, whatever you know, dressing, something like that. It's just amazing material. And also, somehow, we need a, a thought, from, sort of, you know, outside, outside the research box, to bring all those fresh ideas – you know that can be handbag, that can be... something like that.

SPEROU: Yeah. As an artist I'm interested in the body as a tissue like substance because I, I sort of work with textiles and to me, there's not a great difference from the human body as a tissue, as fabrics as tissues, or plastics as tissues, to me they're all sort of materials that can overlap and that one can be found inside the other. So, yeah, I found it really exciting that I can follow my own vision but also bring it together with Peng's vision and together we can sort of come up with new questions and new ideas.

HUNTER: And I think the wonderful thing about this is that, you know, later on there is opportunity for you to commercialise if you choose to, yep, and you become part of that. It's not just Niki's or Peng's, it is a collaborative...

SPEROU: It's definitely collaborative work, yeah. Yeah, we've been enjoying working together and discovering... together.

SU: Of course, and also, if there's any (commercial), we'd be more than likely to have a patents and products being commercialised at the end of this project or even next year, and so for the intellectual properties and everything obviously it's, you know, it's for the inventor, and who you work on it, it's always shared, I mean that's the best, right. *(laughs)*

HUNTER: I think ANAT, when I was talking to Vicki about that, she said you know that they were quite strong in making sure that that was something that they work with the artist with as well, to ensure those sort of things. I was gonna ask you how Covid had affected the actual research but I think it's already come up in the conversation with the whole idea about the masks, etc. Did you find that, you were still going in, it wasn't like you were working from home or anything like that? 'Because laboratory based, I'm pretty sure you would have had all of those sort of sanitisation issues already in place.

SPEROU: Because we're part of the School of Medicine we never closed. So, we continued to work as normal, business as usual. We did have distancing, social distancing in place, and sanitising in place and we really do understand microbes. *(laughs)*

HUNTER: Yeah *(laughs)* Yep.

SPEROU: So, we just continued business as usual. We were very lucky, where other people have been suffering and not able to go about their usual work schedule, we've been able to continue to work. It's been great.

HUNTER: Awesome, thank you so much for coming in today, and telling us about your project, and I am actually really looking forward to reading up more on it, and I know that you have a blog going.

SPEROU: Yes.

HUNTER: How can people find that blog?

SPEROU: You just look on the internet. I think it's [ANAT 2020 Niki Sperou](#)³. I'm pretty sure that's it.

HUNTER: Put that in your search engine and you'll be amazed, there's a wonderful blog with certain processes, and there's images and everything in there. So, if you want to find out more, check that out. Thank you so much.

SPEROU: Thanks for having us.

SU: Thank you.

³ www.sperou2020.blog.anat.org.au