Susanna Elliot (00:00:00):

Good afternoon everyone. And thank you so much for coming to this session, braving the cold and the wind this afternoon to come along and listen to the session about a passion for science. First of all, I'll start by telling you who I am because I'm not on the program. My name's Susanna Elliot, and I'm the director of the Australian science media center in Adelaide. And some of you might know this center as the baby of Baroness professor Susan Greenfield, the neuroscientist who was out here as an Adelaide thinker in residence a couple of years ago. And this is one of her offspring. So this, this topic today, a passion for science is one that's actually particularly close to my heart because in a former life, I was a research scientist and I worked for seven years on an adorable little creature called a slime, no going into any details about slime molds.

Susanna Elliot (00:00:56):

But if anyone who wants to know how something that sounds like it's escaped from your bathroom or has been coughed up by your cat after eating something horrible is actually a very beautiful thing. You can meet me outside after the session. I'll tell you all about it, but science, isn't just interesting. It's essential. It's essential to our well-being. And to our future, we have been continuously monitoring the coverage of science in the center over the last 18 months. And one of the things that we found really interesting is that just over the last 18 months, there's been close to a 300% increase in the coverage of science and scientists in the media. So it shows that there is interest out there. And yet ironically enrollments in sciences in many of the different fields of science are actually going down and apart from a few notable exceptions, including China and India, this seems to be a global phenomenon.

Susanna Elliot (00:01:47):

So what's going on? Have we lost the passion for science or are we just not communicating well? So to explore this issue with us today, we have four really fantastic speakers. They're each going to talk for 10 minutes and I'm going to introduce each of them before they talk. And then we're going to have some discussion. Our first speaker today is Dr. John Campbell. Who's a physicist and a communicator extraordinary from New Zealand. And not to be confused from by with Dr. John, sorry, not Dr. John Campbell, who does Campbell live? The sort of tabloid current affairs program in New Zealand. John Campbell has spent the past 40 years exploring this issue of science and the communication of science and overcoming disinterest in it. He's the kind of lecturer that I wished that I'd had when I was studying physics. I might've done a lot better in the subject. You might also have heard that he's a fire Walker, which is not actually a little side industry that he does in order to make money. It is in fact, one of his antics in teaching physics. And I think it's an extremely interesting way to do that. He's also known for a biography that he's written of the famous physicist, Ernest Ruthford and he's produced a DVD that helps high school teachers entertain their way into the hearts of students. He's also created a program for science teachers called ask a scientist. So take it away. John,

Speaker 2 (00:03:30):

[Inaudible]

Dr. John Campbell (00:03:34):

A lot of sciences rather advanced, and it's very difficult to communicate with the public, but so much of it can be communicated in should be an isn't. How many people here could measure the size of a human cell with really nothing maybe want to do that. Next time you've got a blind background, a blue sky is just perfect. And you're just looking at that with relaxed eyes. What you'll see the floaters. Now, these are the dead cells in the liquid, in the eye. And some of these things are smaller and quite sharp, and other things are bigger and quite diffused. These are just shadow graphs on the eyeball, on the retina and the sharp ones are the ones that are close up to the retina. So all you need to do is look at the sky and get a feel for roughly the size of one of these little floaters. And then look at something, say that painting over there and compare the size of the floater with some feature on there. So now all we have to do is measure that distance and that distance there, our eyeball is about 25 millimeters deep. And so those sharp ones are the size of the floater back at the eyeball. And so we just have this long ratio from here to here, 25 millimeters invert there and multiply by the distance on the painting. And you've got the size of a human cell about 50 micrometres.

Dr. John Campbell (00:05:23):

So there's a lot of simple things that can be done and we should be doing them. The ask a scientist program I've been running since 1993, and it's really for primary and country teachers and lower secondary school teachers. Where if a kid asks a great question and it's beyond the teacher's knowledge, they pass it to me. And I get a practicing scientist to write a litter head letter to the child in the classroom. And that's the first stage of magnification. The whole class sees it and the teacher has it for the rest of their teaching. The second stage of magnification is a newspaper column where it has the child's name, the school and the question, and then the scientist's name, their profession, and their organization they work for. And then about 300 words with not an equation that has to be all done in words. And the great questions come from these children under age 12, maybe 14, but from five and six year olds. And they are really profound questions that I suddenly rocked back on my shoes sometimes, and think, holy care, I've never thought of that. And they're entirely uninhibited. Why do we have pubic here? All sorts of funny, funny things that one has never actually ever thought about. And there's some anthropologists that can give a reasonable explanation.

Dr. John Campbell (00:06:51):

So it's initial program. The, I had a primary school teacher who's been involved with this, how they roar Saturday fellowship for awhile. And her job is to go back into the classroom and find out what the children got from these responses. And the final question was, if the scientist was here now, what would you say to them? And this one kid's response was fantastic. It was how come someone who's as intelligent as you use such big words on us, little kids and the medics were bad at that because they would always use a long word to cover themselves near colleagues. I rather than talk about a belly button with it. Although the top question that the kids liked or rather the response was about asthma. And it was a medical doctor who responded in verse. [inaudible]

Dr. John Campbell (00:07:55):

One of the ways of getting unusual science across to people outside lectures. This is university of Canterbury outside the main first year physics lecture room. And there's a display unit for bays. Each of them changed weekly. So students know there's going to be something differently and it can be anything from the start of a James Bond film. So they can get a little physics from that to all sorts of oddities.

Dr. John Campbell (00:08:29):

[Inaudible] We need to use the world around us and rainbows are great things and cartoonists always get rainbows wrong. If it's not that it's a pot of gold there, or some robbers come in to get the pot of gold, but a real rainbow is like that. And the real important thing about a rainbow is that the light coming back to us, the raindrops in this case, a waterfall are all coming from below that bow and above it. There isn't light being returned to us from those raindrops. The fact that we have color is just that blue light travels, a little slower than red light and water. And so we get this change in angle rainbows and not cut perfect colors, the only good color. And there is the red, the risks are just where various colors can reach. So inside there we've got green, but the red is also there. [inaudible]

Dr. John Campbell (00:09:43):

The human eye is a great one to use. And if anyone knows a little about optics, this is a fat lens and a fat lens, different colors come to different focal links, focal positions because of this change in speed between red and blue light, you can see in the back of the eye, there is the lens. That's only a fine adjuster. Most of the change in direction, the focusing takes place on that front surface, which is why people have laser surgery to alter the shape of that. So they don't have to wear glasses, but if that's a fake lens, why do we see colors? Images quite okay. They all seem to be at the right distance. Well, try this one. Now I'll just do this quickly. Cause it takes a little while, but have a go home. You want some really bright red dots and some really bright blue dots. And somehow that rate is almost come brown. So this is going to be great. Now what I'm going to do is I'm going to steer it there, but I want to use the imaging of my eyes only using half of each eye. So I'm going to close my now, if you have a gap doing this, close your left eye, take your right index finger, bring it up to the outside of your right eye until it runs along the edge. The right-hand edge of that picture right. Now, hold it there. Close that I do the same with the lift. Bring it in from the outside. [Inaudible] And can anyone see any difference here? I'm afraid I haven't got a good read on here. I should've made a new one instead of copying a slide, which uses different dyes to the scanning size. If you, what you'll see is that the blue image stands forward and the red image. And if you cover up the inside half of the front part of each eye, you'll get the opposite. And so it's a great example of, we do have a fat lens. We do have terrible chromatic aberration. The eye brain system over evolution has taken this out by having the images on each half of the eye treated differently than putting them back together.

Dr. John Campbell (00:12:24):

How many people are going to be flying home after this? All right, just get a pit bottle. Okay. A soft drink bottle. Actually the Australian airlines user, the we square one, and that would do, but it's not as spectacular. Preferably one was smooth size just before the door closes the aircraft. When you've got on just open the top of the empty bottle and then nip it up again. Now when you're the highest altitude and that's about maybe two thirds of the way into the flight because of the plane, usually climbs is they use up fuel, just put the spot a year and crack it and you'll hear air come out. The other giveaway of course, is that when you feel it, it feels tighter than it was while the pressure air pressure inside there is higher than the Kevin pressure, right? They reduced the cabin pressure as we go up to for two reasons when you're at the highest altitude, Just nip the thing up again and bring it down. And you'll find when you get back to ground, it'll have collapsed. So what was the pressure inside that cabin? Well, there are various ways you can do it. The easiest way is just get some water, put this underneath, open this up. And the water will rise inside here. And they are just lower than this. So the water levels are the same inside and out. And that means the air pressure inside will never be the same as the air pressure app Raleigh has to do is weigh that on your BA on your kitchen scales, then fill the whole thing, weigh it again. And that's close enough. That'll give you the fraction of the water. What you're after is da you'll find it's about two thirds. The atmospheric pressure on the ground. I once had a doctor say, no, no, no, there's no pressure change.

Dr. John Campbell (00:14:19):

It's fine. While we all know there's a pressure change. That's why they hand out the boiled lollies on the air, New Zealand. So when you sack sack them, you're opening up your station tubes. And I will make just one plug for, I think, a very remarkable little gym you have here in Adelaide that just shifted to port Adelaide. I had a look at it the other day. It's a lady who was breeding sea horses for them, the aquarium trade to say all the sea horses taken out of the environment. And so there's an amazing Ray of sea horses that are breeding and have on display. So I recommend that to people. So let's just, anyone can have a passion for science. I mean, garden has already hit it because they grow in things and they know all the little tricks of the trade and are always learning bits about biology and so on. So it's great fun. Get around the world. You get to all sorts of interesting places and even get to stay at the Hilton.

Susanna Elliot (00:15:31):

Thank you. I think we'll hold off on questions until all of the speakers have spoken. So I'm now going to introduce our second speaker today who has many Noakes she's an expert on diet and a senior researcher at CSRO human nutrition, but many of you will know many as the co-author of the bestselling book with CSI row wellbeing diet, which is also known as the book that managed to bump Harry Potter and the DaVinci code off the bestseller list with possibly only the only science book in this country, at least that's managed to do that. So it was quite a feat as you'll see from her biography Manny also wears many other hats, including senior lecturer at Flinders university school of medicine and affiliate associate professor of medicine at the university of Adelaide. Thank you very much Manny.

Manny Noakes (00:16:29):

Thank you. I must say, I think I'm a black sheep amongst the group here tonight. Sometimes you pinch yourself wondering how you got to the place that you're at and talking to a group of people who I'm sure highly intelligent. Clearly you must be since you're here at this time of night to listen to these presentations and talking to you about a passion for science is something that I certainly hadn't anticipated doing my education was from an all girls school. And I must say that I have to thank one of the nuns at the school that I went to many, many years ago, who, when I particularly had an interest in going into a commercial class, said, no, your grades are way too good. You need to go into the general class where physics, chemistry, maths, and so on were the do rigor.

Manny Noakes (00:17:22):

And it was really as a consequence of that, that I'm really here today. The, the school was Mary MacKillop college and of course, Mary MacKillop I think, is now a Saint. And I think she must be since I'm I'm here today. And I suspect that she may have had something to do with it. But if I had to say that I was passionate for science, I'd actually be misleading you because I'm not really passionate about science, I'm passionate about what science can do. And so really I think that when it comes to science, I'm always somewhat intrigued by the fact that at times science is referred to in, in some ways rather like a demigod that that one should bow before. Whereas I, I tend to think of science as a really useful tool to work out how to understand things and how to make things better.

Manny Noakes (00:18:15):

And from my particular perspective, my passion really was related to food and understanding food from a whole lot of different ways understanding food from its cultural perspective, understanding what food does from biological perspective and understanding the implications of that on human health has really led me to where I am now. And I guess nutrition is one of those areas. That's not considered necessarily to be a hard science, but in fact, we still use the tools of observation and assessment and testing to see whether our null hypothesis is correct. And the scientific area that I was eventually drawn into was the area of weight management and trying to understand to what extent we can change dietary patterns to a point where it can improve human health. And clearly in that particular area one requires not only an understanding of biology, but an understanding of psychology and human behavior.

Manny Noakes (00:19:22):

And in, in lots of ways, I think I know a little bit about a lot of things, but certainly a master of none. And sometimes that's the way things work best because if if I were in fact absolutely in entrenched in understanding the details of nutritional science, without having a broader understanding of the context in which those details are applied, the context in which people eat again, I don't think I would be here. I don't think I would have been involved in a publication that became quite so successful. And so in some ways science is, is great, but we need to also be aware of when or the, so what element of science and where we take it from there. So for example, in the obesity area, I can't tell you how many documents there are how many reports, how many, a summit reports, how many inquiries.

Manny Noakes (00:20:25):

And I suspect that probably the number of reports has increased over time. And I don't know that any of those have really enlightened us as far as a community, when it comes to how we, we tackle the problem. And I think the reason is that all, although those reports and I contribute to too many of them, although all those reports contain good science what is really good about science is, is where we take it and how we can apply it. And perhaps my real passion is for the application of science or the science of application rather than the science itself from the mid nineties, when we embarked on some of the clinical studies that led to the development of what then became the CSRO total wellbeing diet. We certainly didn't have that vision in mind, but there were some things that I think back now made a big difference to the ultimate outcome.

Manny Noakes (00:21:24):

And that what really made a big difference was the fact that we had that contact with the general public, that insight into what it was that was being asked, what were the questions that people were wanting to know that we could try and resolve through scientific investigation and those questions related to the kinds of things that were, and still are a point of popular discussion now in relation to popular diets, different approaches to weight management, different approaches to losing weight. And although we could have just said, look, you know, you just eat less and move more. And really a high protein diet is dangerous and you shouldn't do that. When we actually looked at the scientific literature thoroughly, we could not really see that there was enough there to be able to answer the questions in a way that we would feel comfortable.

Manny Noakes (00:22:17):

We w that we had the background in. And so we, we did decide to do some research in that activity. It was probably something that our peers would have perhaps not been entirely comfortable with. But certainly from our perspective, we were answering questions that people wanted to know, and it did provide some useful scientific background and certainly led to a number of scientific publications, but what took it further than that was the communication of that science. And it was the communication of that science that then drew us through a a kind of vortex, I suppose, through a series of events that translated and manifested itself into a commercial publication. And those series of events was the interaction with the media the need to really distill the work that we had done into meaningful pieces of, or meaningful messages that people could relate to and then to take it even further into elaborating on that.

Manny Noakes (00:23:31):

So the very first exposure we had to this was a number of interviews with with the media about the research that we done that had demonstrated that high protein diets or high protein foods improve appetite regulation and certainly high protein diets in certain individuals can be more effective in fat loss than the more conventional high carbohydrate diets. And we saw a difference in people in how they responded so that some people responded well to a high protein diet and other people responded better to a high carbohydrate diet based on their metabolic profile, not necessarily their taste preference. And so that was a new piece of information. But when we tried to communicate that it, it became well. What, what is the essence of healthy eating? What do you mean by high protein diet?

Manny Noakes (00:24:25):

Can you describe what that means in terms of breakfast, lunch, and dinner, which we did and then following that the request was we need more information. You've given us one day. What about two days? What about one week? What about two weeks, three weeks, four weeks and more. And before we knew it, we had a constant dialogue with newspapers around Australia, whereby we were providing information on the practical application of that science, which was then taken up by or spotted by a publisher. And again, we were on that runaway train that seemed not to be able to stop. And, and certainly we often questioned whether we should be there at all, and whether we should jump off before we, we got ourselves into a lot of trouble we certainly got ourselves into a lot of trouble. And, and much of that was in how you translate science to the general public in a way that makes sense, but it also does not, does not take away from what that science actually said.

Manny Noakes (00:25:32):

And that is a massive, massive challenge because the detail often has to be lost in, in, in the in the communication. And so we need to ensure that we don't lose the important detail and just communicate the main messages. I think there's a real art to that. It's certainly an area that I still can't say that I feel completely comfortable in. But we, we were very, very fortunate to have an interaction with publishers who were able to assist us to translate some of that science into words that we felt comfortable with. And they also felt were written in a way that, that people could understand. So there's much to be said about good science and, and doing it. There's much to be said about things being tech technically perfect, but sometimes things can be technically, technically perfect and practically useless.

Manny Noakes (00:26:26):

And I think that that's very true when it comes to communicating issues around diet and health. And what I see at the moment is a real evolution in the translation of science in the health arena, and trying to capitalize on that wealth of knowledge that we have in a variety of different areas. And that's not just nutrition, but in other areas and putting it into practice such that we can, we can make a real difference. For example, issues like a four kilo weight loss in people who've got a family history or predisposition of diabetes, if that's maintained over four years, can prevent type two diabetes. Now that's been known for some time, how do we translate that into operations into our medical system, into programs and policies in the community. And we really haven't done a lot of that at this point in time.

Manny Noakes (00:27:25):

And much of it has to do with working our way through the healthcare system and the fact that still there is a lot of emphasis on new technologies, new pharmaceuticals things that are very high tech that clearly can be very, very important and very very useful in terms of maintaining health and wellbeing, but also the cost to us as a community can be incredibly high. And so as we move towards a population that's aging, as we move to a population that is going to have a need more healthcare resources we need to look at how we can apply some of that good science that we already have and translate that into very, very meaningful programs that relate to relatively low tech areas like diet and nutrition and communicate that in a way that people can understand and accept the fact that sometimes we have to forget about the detail in order to really make a difference. So passion for science. I think I, I have a passion for science, but as I said to you, my passion is in the communication of that science, the translation of that science and I hope that that leads to some some benefits for the future. Thank you.

Speaker 2 (00:28:52):

[Inaudible]

Susanna Elliot (00:28:53):

Thank you, Manny. Our third speaker today is Tim Radford. I first met Tim at a very technical conference in the Netherlands. It was a very large conference, lots and lots of scientists talking about very technical things. And he came along to try and persuade the scientists that communicating science is really about telling a story. And I think he made that point very well. I'm not sure that many of the scientists succeeded at it, but he certainly made that point extremely well. Tim was born in New Zealand but then he moved to the UK in the early sixties and spent the last 45 years or so working for various publications, most notably the guardian in London, he taken on many different roles, including litters editor, arts editor, literary editor, and science editor. And I think in a way that's one of the things that that makes Tim's perspective, particularly interesting because he's, he's coming from the other side. If you like, and he's looking at science from the outside and having worked in so many different areas, it means that he knows better than most how science compares to other subjects and why it perhaps doesn't do so well in the media and how scientists can actually do better. So thank you very much, Tim.

Tim Radford (00:30:23):

I'm glad we've made this point clear. The reason I liked science is because it gives you a chance to tell a story that no one else has ever said before. No, no thriller writer can ever write something that has never been written before. Certainly no romantic novelist, no economics, correspondent, no polit sort of correspondent, a science writer can say something that has never been said before every day. That's a fantastic privilege. It doesn't mean we do it, but it, it, it is a challenge. I think that I will cut to the chase and simply describe a perfect day for me as a reporter.

Tim Radford (00:31:06):

But I'll just to a tiny detour science scientists are actually quite difficult people that is they, they themselves are the problem, not the, not the solution, but the problem. Many of them feel that they feel uncomfortable actually trying to try to interpret science for the public. And they sometimes need a bit of help when I was on the arts page. If I rang up a poet and said, give us a glib quote, please, for this afternoon, something about Fetcher. I got one straight away. Absolutely no problem. If I rang up a scientists and said, will you please, will you please say something slick and facile in one sentence? He would almost certainly say, well, I'm hardly the right person of that. Or boy, I think you should actually wait for so-and-so to get back from the field in about three weeks. And then this of course has no help to a daily newspaper man. That that is the end of the aside. I will now tell you about one day, one very happy day in a reporter's life.

Tim Radford (00:32:07):

I went to the natural history museum to do a little story about Neanderthal man. The end of toll man is of course the hour, our co-tenant of the European continent for something like 30 or 40,000 years. He, I say he, but you know, that I've been, they disappeared in about 30,000 years ago. And it may be that they perished in competition with the homosapiens. It may be that homosapiens and they actually fought. We don't know what do know that hope that Neanderthal man was large, had huge nostrils was adapted for cold. And it wasn't as technologically clever as homo-sapiens nor was he as graessle. And there was a kind of presumption that homosapiens was the slender soccer playing David Beckham type. Well Neanderthal men might've played rugby league for holdings and rovers, and generally acted in a brutish way. The paradigm, however had subtly changed.

Tim Radford (00:33:12):

And that was the point of going to the natural history museum. They were actually doing a, a new look at Neanderthal man with a new exhibition. And you might say that they were presenting him as a much more refined person, possibly even a metro-sexual that is that there had been a number of discoveries, which suggested that that Neanderthal man was much more interesting than anyone that hid the two, given him credit for being there was the discovery of a skeleton which had horrendous injuries. All of which had recovered. You can conclude from that, that somebody looked after the man while he was in, he could, he couldn't possibly have fit himself or hunted in that state. So you can infer. And the end of town health service, then there was the clincher, the discovery of a grave of a two year old Neanderthal child who was found lying on his back with his arms crossed.

Tim Radford (00:34:05):

And underneath the right hand was a toy X. I don't need to reconstruct the story for you. You can do it for yourselves. These were people like us, and they felt like us and their responses were ours. So I could have had all this just by ringing up Chris stringer, who was the, who was the scientist in charge of human origins at the natural history museum and using the picture that the press release had sent. But actually I just wanted to get out of the office. And it's always a good idea for a reporter to leave the office, to refuse, to look at the internet, to go and talk to a person. You never know what you're going to find out of those circumstances. And on that day, I struck gold. The story of the Neanderthals by the way, was a formula one.

Tim Radford (00:34:49):

It's the sort of thing that you can predict. It will be a story. You can predict how it's going to, how it's going to work out. You can even think of the headline before you go there. While I was at the natural history museum, I caught a radio news flesh that said that 24 sperm whales had been washed ashore on a beach and stored away in the north of Scotland and an interviewer on the radio simply said, perhaps scientists could hold a post-mortem on, on them and find out why they beached themselves or in practical terms, you wouldn't ever discover why a spoon weld beached itself by conducting an autopsy. But I did wonder how you would go about conducting a post-mortem on a sperm whale. Yeah. Now I asked this question perhaps a little too loud because the door burst open and out came a Nick theologist from the natural history museum, who said, in fact, of course, he must have been a zoologist who said Tim, to conduct a post-mortem on a spoon.

Tim Radford (00:35:45):

Well, first of all, you need a very long rope for repelling down a cliff. Then you need a chainsaw that you can sling over your shoulder because you have to cut the bloody thing open. You also need, he said a very large pit prop, a stake to keep the thing open while you climb inside, you need very good waterproofs because it's disgusting in there. You need a plastic bucket effect, several plastic Packers to collect the samples because you will never know what you'll find. I once found, he said an eight meter nematode worm or tapeworm. And he said, and most of all, you need a dead up-to-date accurate set of tide tables to know when to get out.

Tim Radford (00:36:30):

He then proceeded to tell me these dazzling stories of adventures with, with, with decay, dead and decaying, sperm whales on the beaches of Europe and the problems that were disposing of the carcasses and the way they kept coming back. And all I'd had to do was to sit down and listen. And then I went back to the office and I wrote 2000 words, which became the cover story for our science supplement. Headed those of you who are old enough to remember these things. It was headed strangers on the shore itself attribute to a jazz band of the sixties. But that wasn't the end of the story I had. I'd gone. Yeah. I got the story. The news desk expected. I'd got the, the bonus of a, of a, of the, of the lead story for our science supplement the next day and leaving the building.

Tim Radford (00:37:17):

I was detained yet again, this time by Dr. Monica Grady, who is a pretty considerable expert in meteorites and herself, a very good communicator with the press. She was bubbling over with excitement because she had discovered something completely unexpected. She had been studying the skin of a European recoverable spacecraft. Now what had happened was that the European space agency had put the spacecraft into high orbit, left it there for three years, then asked NASA to go up there with a pair of kid gloves and an open bay in the shuttle, catch it, bring it back to us. They could cut the skin up. They could show the skin, the, send the skin to a hundred. And I think 20 different universities and each university scientist with his electron micrograph would start counting the pitting, the damage, the abrasions on the skin of the spacecraft, because space is not empty.

Tim Radford (00:38:11):

Something like 40,000 tons of Rockies material comes crashing in from comets and asteroids every year. And the stuff is flying in at 20 kilometers a second. You don't want to be in the way. And if you do want to be in the way you want to be hit only by something ever so small, because anything, anything was size of a grain of rice would go straight through you. So this was a service to the satellite industry. That's why it was put up there, but that's where it was taken down. That's where they were studying it, but it wasn't the pitting on the skin of the spacecraft. It intrigued her. It was the discovery of a little suite of chemicals, which however you looked at them could only be dried human urine. Now you might say, okay, so there was clearly some amazing competition at a boys school to who compete the highest, or you could say it was up there anyway.

Tim Radford (00:39:13):

And that of course is the obvious conclusion it was up there anyway. And it wasn't very hard to reconstruct how it got up there, because as many of you will remember the Apollo, the Gemini astronauts went up there wearing diapers, nappies, or Pampers. So they, if you were sitting on a spacecraft for eight hours before it launches, you start crossing your legs quite soon. And of course the shock of being lifted into space itself would probably be quite bladder emptying. The, the, the NAZA astronauts actually found the idea of having to, having to, having to orbit the earth for several, for several hours in nappies, pretty disgusting. And they actually came up, they pleaded with NASA to come up with another solution and NASA with its technological might did. So it produced a thing called a post nutritive substance disposal bag. Now only, only NASA would come up with a thing like that.

Tim Radford (00:40:09):

It was of course, a plastic bag into which you it, which you evacuated whenever waste you head, and then you seal the nozzle and then you put it down. But of course there's no down in a spacecraft at all. It floats around the stuff. And so there was a tremendous pressure to get rid of it. And whenever there was an extra vehicular, extra vehicular activity, people would open the space bay doors and Chuck out the trash, leaving the staff, of course, in space. They came down that stayed up there. It went round the earth every 90 minutes at 17,500 miles an hour freezing on the dark side of the earth because the temperature falls to bind us 200 expanding madly on the sunny side, every 45 minutes, a frightful accident waiting to happen. The headline was astronauts caught spending pennies from heaven, which is so... I'll stop there. Thank you very much. [inaudible]

Susanna Elliot (00:41:29):

Thank you, Tim. And he's certainly confirmed that. Telling a story is a good to communicate science last, but certainly not least. Our final speaker today is Norman Swan. The man known as the person that the broadcast of the sexy voice. So even if you don't know his face, as soon as he opens his mouth, you'll know that he's the recognized him as the host of the radio nationals health report, which goes to air every Monday morning. Norman is not only an award winning broadcaster. He's also trained as a medical doctor, and I'm not going to list all of his awards cause we'll be here all night. He's well known for helping scientists, Phil Vardy expose the major scientific for fraud perpetrated by William McBride, which some of you might remember a few years ago. So over to you [inaudible]

Norman Swan (00:42:27):

I probably won't get this quote quite right. HR Minkin the famous American wit and writers said that for every complicated problem, there's a simple answer, which is almost always wrong. And one of the things that I quite like about science is that it's often counter-intuitive and things that you think should be so often aren't. So and I'm often surprised at the people who don't believe in science like Tim, one of the pleasures of them being a science broadcast or science journalist is telling stories. And we all have our kind of shocking stories. I'm always shocked by the statistics, but I don't think I've changed through the years, which is roughly 30 or 40% of any medical student class don't believe in evolution.

Norman Swan (00:43:23):

They're doing medicine out to be a religious belief and religious commitment, truly scary stuff it's been done in more than one medical school in more than one country, consistent finding. There was a famous story, which to more remember of a few years ago, quite a few years ago. Now it must've been about 1984. It's not long after I started being assigned a dropped brought broadcaster. There's a seventh day Adventist hospital in California at Loma Linda and their cardiac surgeon. Pediatric cardiac surgeon had transplanted a baboon's heart into a young baby, and he'd done this. The baby had a what's called hypoplastic left heart syndrome where they're born without the left side of their heart. And it's a universally fatal problem unless you can transplant the heart, which is really only a recent thing. Or in this case, they, he transplanted this baboon heart and it was enormously controversial.

Norman Swan (00:44:28):

There were he wouldn't give interviews. The baby was dubbed baby Fe and they were international headlines and Betty fever regrettably died a few days later and this was just medical experimentation. Probably without ethics committee approval done writ large. The parents are probably agreed to it but not necessarily knowing the full the full story. But anyway, I managed to get an interview with the surgeon and he hadn't given the interviews. And the reason I knew I could get into it was there was an Australian based at this place. And he managed to get me this interview. Anyway, one reason I discovered why he'd never given an interview was that he was the world's worst talent. So he didn't open his mouth when he topped this wouldn't matter to Tim from the guardian. He cause he writes it all down, but you know, I actually need somebody to talk and he, he was just boring and gave the most boring answers to my questions.

Norman Swan (00:45:33):

So I'm gonna, I was really struggling for something to get going. So I said to him, could you just explain to me the evolutionary gap between humans and baboons that would, you know, made you think that there wouldn't be any rejection in the process. And he came back and it was a long pause and even longer than it had normally been this extremely boring interview. And he said, well, that's kind of difficult for me to say, because I don't believe in it. Evolution point really failed me to come up with a follow-up interview, follow up. It suits people when to believe in science and suits people when not to believe in science and sometimes for actually very good reasons because Tim quite right. Yeah. They say there's a science journalist. You can say something entirely new based on what somebody has come up with.

Norman Swan (00:46:33):

Isn't it fairly new, but of course, six months later it could be entirely. And not through any fault of the time, that's what science is. It's a zigzag process where you think something's right and then it's wrong when you move back. But of course the public kind of realizes that and you kind of realize that, well, sugar is bad for you one day, but it'll be fine. The next day, something causes cancer one day and it's wonderful for you the next. And we zigzag this way through life so we can blindly ignore it until it suits until it suits us. The I just don't the counter-intuitive stuff. And John was trying to describe, you know, how you get the size of a cell. W when I was in first year medicine, one of the questions I got in biology was if that's the, the, the what's called the [inaudible] and the kidney where would be the, you know, the rest of the tubule w where would be, you know, and I, I was just going on the diagrams and the textbook, and I'd start with sitting down here rather than running the corner and across the street, the sizes just don't match.

Norman Swan (00:47:39):

But so things are counter-intuitive and we don't actually really come to terms with that. And we're science is not very good as interacting with the emotional world of perception and where we don't like to believe things. I think I w as some of you were talking yesterday about the germ theory of disease, when pastor came up with the germ theory of disease, which is the notion that bacteria caused diseases, he wasn't the only one to cope with it, but he was a key one. It was resistant by the medical profession for 30 or 40 years. It took a long time for the germ theory of disease to be accepted. And yeah, yet when the idea of vitamins were, when vitamins were discovered, they were accepted almost overnight, and there are various explanations for why the, the, the, the idea of vitamins were. So it was a rapidly accepted, and the notion of germs was sort of [inaudible].

Norman Swan (00:48:45):

And one, one theory is sympathomimetic magic is that we have there going back in evolutionary time, there was a notion which goes through which crosses cultures, which is that we can acquire strength from other things. So native American tribes, when they look at wood railway started to penetrate the American Midwest would go and get the grease of the axle of the locomotive and eat it. You know, our ancestors would eat the hearts of their enemies to acquire the strength of their enemies. So the notion that you could actually take something that would somehow give you strength was very important. And of course, we love it today. We love taking things, cause we, th we think is gonna make us better. And and we love the idea of things being natural and green. When even though they might be really unnatural and greens, just a synthetic color added to make it look good. And of course, the reason why the germ theory of disease took one reason why the germ theory of disease took a long time. Well, first of all, doctors are very resistant to evidence. It's been said that it took till 1913 for it to be safer, to go and see a doctor than to stay at home and hope for the best. And almost every person in this hall would know a doctor who's still stuck in 1912.

Norman Swan (00:50:22):

So doctors don't have a sort of stellar you know, track record when it comes to evidence. But also they actually, there were people in the in the 19th century who reckon that wasn't so simple when it comes back to you that intuition one can get about science, that you may not want to believe it 100%. And one of the great opponents of the germ theory of disease was Rudolph virtue. Great pathologist of his day, modern pathology would be nowhere without virtue in the same way. The pastor discovered that Jeremy's caused disease, virtue discover, or I made the observation that you could track the origins of disease by the cellular origin, the cells that you could find in the disease themselves and others by tracking the evolution of sales, you could actually see the development of disease, cell cellular origin of disease. So what a pathology is based on this, he was a great 19th century scientist, and he led this great 19th century.

Norman Swan (00:51:23):

Scientist led the charge against the germ theory of disease what's going on there. Well, virtue was a lefty and he was a social radical. He'd seen the riots personally and upper [inaudible] of the famine rights, not presale easier in the early mid sort of mid to early to mid 19th century. And he was firmly of the view that disease had social origins. He could not believe that Jeremy's had such that such a simple answer as a Jeremy causing disease. And of course, both pastor and virtue were right. Pastor was right. The germs did indeed cause disease. But if you just take tuberculosis, when Robert discovered the tubercle bacillus in Germany in the late 19th century, he was right that the tubercle bacillus caused TB. But what didn't know was that most of the people walking through the streets of Berlin would have been carrying the tubercle facilities, but only some of them got it.

Norman Swan (00:52:28):

And many of the reasons they got it were actually social and genetic rather than by firmly biological. So what I love about science is that interaction with the world around us and the, the, the, the chance one gets to be naughty and counter-intuitive, and to dig in under, under people's beliefs, including my own, we won, which I still get emails about it is because people just love this notion. We love the idea that emotions and our psyche can affect the diseases we get. And indeed, there is some truth to them that chronic stress and I spoke about this yesterday can co you know, there's good, solid line between chronic stress and it'll help, but people also believe that when you got cancer, your attitude matters. You gotta have a positive attitude. I can't tell you the harm that does, because if people get a recurrence of their cancer, well, first of all, if they've got cancer and they're feeling pretty bad about it, they feel guilty, but feeling bad about it because they feel they've got to feel positive about it.

Norman Swan (00:53:45):

And when their cancer comes back, they think it's their fault because they weren't positive enough, or they didn't go off to some ashram for some meditation. And thankfully somebody has researched this in Western Australia and in Victoria and track people through. And there is no correlation between a positive frame of mind and how well or badly you do with cancer, no correlation at all, which is both good and bad news. But my view is mostly good news because in fact, you can't, it takes that heat off people. Who've got the problem from blaming themselves. It's bad news is that it would be nice if by manipulating somehow your frame of mind, you could actually cure your cancer, but unfortunately you can't, but science is like that. Thank you

Susanna Elliot (00:54:43):

To kick off the discussion by asking why is it that many scientists don't actually communicate with passion? I just have a little story to tell about this because we're dealing with journalists all the time in the science media center, and we get a lot of very strange calls. There was one particular case where a politician had made a statement that recycled water was going to feminize the population. And he was very worried about this. The male population was going to be feminized by drinking recycled water. So of course we started getting calls from journalists. Is this true? Could it possibly happen that that recycled water is going to feminize the male population? So I rang a scientist happened to be a woman in Queensland. The statement had been made in Queensland. And the first thing she said to me was, well, you know what I think that the male population in Queensland could do with a bit of feminizing, but of course, when she came across on radio, it was rather a rather dry interview. And of course it wasn't ethically correct for her to say that. So she didn't say it, but you do wonder sometimes if perhaps the constraints on scientists to not be humorous and to not use colorful language, sometimes turns what it turns. People who can be actually very humorous into fairly dry people when it comes to being in the public eye or on the meat in the media. Any comments on that?

Manny Noakes (00:56:11):

The nature of science is to be dispassionate, is to look at the data objectively and to weigh, you know, what it is that you're seeing. So if you look at how June was written you know, in the passive voice, it is clearly the nature of how so-called Orthodox science is expressed. And so there probably does need to be another kind of individual that is that person that does that translation,

Norman Swan (00:56:37):

Right. Just better special is a con I mean, just look at the arguments you have with your colleagues in Sydney about the glycemic index versus the high protein diet. I mean, it's like murder at 20 paces. You know, it's not dispassionate,

Manny Noakes (00:56:53):

That's unfortunate because in, in some ways when it gets to that level the, the facts start to go out the window. And I think that it's one thing to talk to the public about how something might be important and, and, you know, it's fantastic news, but when you're discussing your work with scientists, you really or not to get too emotionally involved and look at the data and try and talk along those lines. So as scientist to scientist, it's dispassionate, obviously you have to deprogram yourself when it comes to talking to the public.

Tim Radford (00:57:37):

There are there, there are several problems with this. One. One is one is that science itself is it likes to likes to persuade people that it's really dealing with probabilities and not certainties, but what the public wants, what anyone wants is certainty. I don't, I don't go to a a geochemist to, to, to hear him say, well, there's a 90% chartered slate, but actually there is, you know, there is there was I, I reserved the right to a PIP to be wrong, which is, which is how a scientific papers are written. This gets confusing. And of course it's led the United States science community after Gumtree. Because by, by, by introducing the notion of uncertainty, they left the they left the white house administration with the feeling that maybe the science is not solid, but in fact, the scientists are there just, just as ferociously bad habits scientist have of trying to cover their tracks.

Tim Radford (00:58:37):

That's one problem. Second problem, which is real enough. I mean, it's you know, there is the aspect, I don't know, all around us. Here are some words Gaussian distribution mitochondria. Why is ASTA C L BBDO? I'll stop there. Oh, it fell. Oh yeah. Why'd my favorite phenotype. Now you will never ever hear those words in a pub or on a football ground. You just, won't, they're real words. They have no other, they ha they, they, they describe something which, which is important and which is not negotiable. You can't, there are no similes for these words, so you could write your way around them. And then there's this other problem that problem with which of course you all know and hate. We have Frankenstein foods. We have Pandora's box. We have Felsted bargains. We have thinnings of the wedge.

Tim Radford (00:59:32):

We have playing God, all these frightful cliches, which sometimes called journalists, these which actually get in the way of understanding. They don't mean anything. A Pandora's box is often produced as a sort of an image of science as if somehow, so I just we're opening Pandora's box and all these evil things were coming out. In fact, Pandora, as she tried to put the lid back on the box, heard this little voice saying help, please let me out. And she opened it again and out flew hope. And now that's a lovely metaphor for science Frankenstein's monster. You will remember if you've read the book, actually tried to help people. And they ran away screaming when they saw who was helping them. And that is actually quite an interesting metaphor for science as well. So, so journalists are part of the problem as well as part of the solution, but I have it Norman and I have spent most of our lives trying to be part of the solution without however, trying to be boring.

Susanna Elliot (01:00:39):

John, you you've worked with, with scientists a lot, and you're a scientist yourself. How do you feel about the way scientists communicate?

Dr. John Campbell (01:00:50):

Well, there a standard mix of society, and there are some that shouldn't be let out on chain to a pig or a quite good ever a drink with. There was a fellow director who got the Nobel prize and he was a dry Englishman and it was highly involved, mathematic physics. And he was at dinner with someone and they adjust, I think it was predicted that positive electronic to exist. And he asked direct to explain what he's doing. And this do a fellow just said, what do you know about fourth rank tensors and Blake said nothing. He said, you know, I can't talk to you. On the other hand, I have a friend who is one of the top condensed matter physicists around she's in the Midwest university. She could do a superb cabaret act writing songs involving science. So it's a, it's a great mix. It's a great shame, more can't talk clearly. They don't talk to the general public because if they do, they'll get pulled up all the time and then have to talk more clearly to people. But it's really just a mix the, the one time where it's absolutely positive and made clear, and anyone can understand it because when they're applying for grants to do the next one, and if they are smart, they're describing the last bit of work lab done. And that way they'll get a reputation for being extremely good.

Norman Swan (01:02:29):

So scientists get promoted, not by how often they appear in the guardian or on radio national. They get promoted on how many peer reviewed papers they have in journals, and therefore that's what they're judged on. And and they, they might prepare for a, to talk in front of 30 of their colleagues for months on end and agonize over and Polish this talk. And yet when Tim interviews in the hundreds of thousands of people will actually read that person's words and they'll give no thought or very little thought to that at all. And so the audiences are just vast for this message. And it's an important message which gives public support to the research endeavor. And we don't spend enough in this country on research endeavor. We do get a bit better than we used to, but we're still not matching Britain for example, and certainly a long way behind the UK.

Norman Swan (01:03:27):

And you can not expect the public to support science unless you, unless you talk about it and communicate it. John Duran from Oxford did a study many years ago now published in nature which showed that the public's attitude to science was directly correlated to how much they knew about it. And if people were ignorant of science were more negative towards science and then taking this state, and that's a problem for society if that happens. So it is absolutely a responsibility of scientists to communicate. And when they communicate via people in the media, they are getting to vastly more greater numbers of people than the otherwise would have. And it's as important for the scientific endeavor and the, or the source of work that many and Peter have been doing in publicizing, an evidence-based diet has, has had enormous impact and translating what was originally a randomized trial in a high protein diet, into something that's practical for people's lives. That's actually going to do the much more good than the 99% of rubbish that's out there as far as diet is concerned is what we hope that science is about.

Manny Noakes (01:04:39):

Sometimes Norman. I mean, you know, when you, when you look at some of the water that's gone under the bridge, one of the real criticisms that came about was the term scientifically proven, which of course in science one can never do. But when our publishers said, look, you know, put this on the front, because that gives a sense of the credibility of the organization. We thought it through, we thought, yeah, we've shown that, you know, you lose weight on high protein and you'll lose more abdominal fat mass and so on and so forth. Yeah, that sounds fine. You know, sort of taking things perhaps a tad further than a technical journal might, but this isn't a technical journal. The next thing we knew nature had a scathing article about that very term, scientifically proven. So your peers are actually your worst critics when it comes to talking to the media on the other side of the coin, now our organization is starting to look at what is the impact of science. And so scientists are now being rewarded, not just for publications in peer review journals, but also what is the consequence of that science? So I think we're starting to see a move towards the impact of science rather than the academic side of science, per se.

Susanna Elliot (01:05:59):

Do you think this should be built into the to the funding set up so that scientists all over are actually judged on the basis of, of their communication skills or their ability to, or the number of talks they've given in the media? Or

Manny Noakes (01:06:13):

I think that some sorts of science is more amenable to being media worthy than others, and that doesn't make that science better or worse than any other science. I think you need a whole spectrum. And some kinds of science are obviously closer to having an impact on, on the public than other kinds of science. So we need to respect both of those types of scientific endeavor.

Tim Radford (01:06:36):

The British government actually builds spills, a certain amount of money into all the research grants to encourage public outreach. I think the hideous term is, and there has been a consistent effort in Britain in the last 20 years triggered by John Durant's research. For those of you who don't know the full story, he simply selected a thousand people and said, are you interested in science? They said, oh yes. Hell yes, cautious. And he said, would you like to see more and better sides in the room and on radio and television and newspapers? And everyone said my word, yes. And then he said, does the earth go around the sun? Or does the sun go around the earth? One in three, he got it wrong. He then said, how long does it take two out of three? He could not answer the question. And it became clear that we were dealing with the w w we were dealing with a public, which had still not caught up with Copernicus, let alone Crick and Watson. So, so there is, there is, there is some, there is some huge, huge efforts that need to be made on both sides. I've said before the media are a part of the problem, but some of the media are also trying to be part of the solution. We do however, urgently need scientists themselves to see that there's nothing shameful about talking to human beings, especially taxpayers.

Susanna Elliot (01:08:04):

John, you had a comment.

Dr. John Campbell (01:08:06):

Yes. There's been a tendency to have amongst the funding. You have to show you have an outreach program. So these places do now their heart and soul, not in it, they're doing it to get their money. And that I think is a shame where it's forced that way. I know with my ask a scientist program, NSF funding, the condensed matter labs hit to have an outreach program, or they wouldn't get the funding. One university materials seemed, it copied the ASCA scientist program and they got the funding and a very famous one didn't and they didn't get their funding. So then they got an outreach program, but not because they believe in communicating with the public, but because they have to, and once you do that, you don't really get the passion. They love variably employee, someone to do it. And often it'll be spin doctors, mayor to put the best face on it.

Dr. John Campbell (01:09:09):

The other thing I think we are, there has been a change. I can speak about New Zealand and agriculture, where we once used to have a department of scientific industrial research. These were government scientists, and they did all the background work and farming source on improving cattle, sheep, all sorts of things, and dumb governments break this up. They have to make their own money. Now, while you've got these unemployment and scientists around, they will form little companies and they'll do this, but who's training up the next generation and to make the money they will go to, they will take on jobs for Australia farmers and that word they cannot talk about because they've been paid for it. And it's what governments want put value on and intelligence. And they could tell you about it, but then they'd have to kill you. And so I think that's been a great detriment to that. And one other area, there is a university academic. If I were starting up a course or measurement techniques, I'd go up to the government scientists who worked in this field and just sit down with them for half a day and get all the great stories I could tell students there, they have to account for every 10 minutes of their time. They do not have time to sit down with me and tell us this. I think they now have maybe half an hour, a day where they might be allowed to do this, and it gets ticked off on some box.

Susanna Elliot (01:10:43):

I think we might, at this point, take some questions from the floor, questions or comments. If you'd like to come up to the microphone that you'll find in the middle of the room, please try and keep your questions or comments short so that we can fit in as many as we can.

Audience member (01:11:00):

Norman, you mentioned the dictum Mencken, that complex questions don't have simple answers. Is there an issue in science that a competent and honest scientist will recognize that complexity and will tend to give a qualified answer? Whereas one who is either less competent or less honest can give a totally assured a very positive unequivocal answer. And so in a court of law or a parliamentary inquiry, or indeed in the sort of doco, which the ABC is proposing to show next Thursday night, junk science can seem more convincing than an honest attempt to wrestle with complexity.

Norman Swan (01:11:36):

So let me just introduce one of our more successful science communicators professor Ian Lowe from Griffith university. The look, the answer is yes, of course, is that complexity is a difficult thing to communicate. And one of the risks in going too much overboard in incentivizing people to communicate more with the public is you, you get to a situation where we were at in Australia and Britain was at, in in the late sixties, early seventies, where you had shore ponies who didn't publish, but published in the daily Telegraph or you know, the Herald sun rather than in learner journals. And it, it created a bit of a crisis. And it's through the creation of sort of reasonably trained science journalists that you'd be able to, you know, that you would only trip tend to broadcast stories that actually had published first and therefore been through peer review, but that complexity does make it difficult.

Norman Swan (01:12:35):

And it's what Tim was alluding to earlier, which is the, the uncertainty that is always around that. And you just have to look at even the last climate change report, which even now it doesn't say we are, that we are sure. It's just that our degree of certainty is getting so large, is that we're almost sure. And which is incredibly frustrating, but I think there is a way for people to confidently say the balance of information is here. And that's where, you know, people like you in have actually said that and communicated honestly, and equivocating just doesn't get anybody anywhere you've got to sort of take. And Manny was referring to that earlier earlier that you, you roughly know where the balance of evidence lies and that's what you got to go with because you're not doing the public service by the zigs and zags of research. You're, you know, the area and you can synthesize it. And of course in medicine, what they've tried to do is they created this Cochrane collaboration, which tries to bring together the available evidence and even out the zigs and zags, but it is one of the barriers. Absolutely. Right.

Tim Radford (01:13:42):

The media in some ways has, has begun to grow up a bit. When I started reporting on science there were cures for cancer discovered every week. Now, no journalists that I know of believes that any would believe any scientist said I've found the magic bullet. On the other hand, we're telling our stories at links of around 350 to 700 words, 700 words is a lot in the newspaper. And there is not much room for caveats, probably perhaps almost certainly quite useful terms that indicate that the, that the, that the, the question is not entirely sewn up. We get into real problems where we discover that you are dead. Sure. But you're not going to say so in on in in a scientific paper for reasons which are perfectly understandable, but when I ring up a scientist and start talking about a caveat strewn probability riddled paper, I do, I do expect him to tell me whether his research is on or not.

Tim Radford (01:14:55):

And if it's on, I feel free to actually say something to make up his mind for him and let him have the, have a paragraph of uncertainty somewhere further down. Otherwise I didn't have a story at all. So you, you can't, you can't build a story out of let me newspapers or competitive environment. If I go up to my news desk and say, I have a very interesting story here about a potential advance in our understanding of the development of set of of the molecular biology of small cell cancer in laboratory mice, mind you not in people. And my colleague comes up and says, well, I've got this story about David Beckham, three trollops and four lines of white powder. Which one are you, which one do you think you're going to read? I mean, that's, that's, that's, that's how bad it is. So all our science stories actually end up saying something fairly firm, even if it may be turned out subsequently to be wrong. That wouldn't be the first time an expert had been wrong and in public, I mean, politicians and economists to roll all the time, football commentators are wrong, often, what's wrong with the scientists being wrong sometimes,

Manny Noakes (01:16:19):

But even if what you have put in your article is, is reasonable. That doesn't mean that what is read and understood, which will be a fraction of it is necessarily what you intend and much would depend on the headline and probably the last sentence or a few things like that. So it depends whether the science communication is, is for the purpose of providing information or whether that science communication is for the purpose of changing an attitude or a behavior. And they're quite different things.

Tim Radford (01:16:46):

I think I couldn't confidently with my hand on my heart, tell you that the purpose of providing information for me is to be read. I would like to be right, but boy, do I want to be red? And this is the serious thing we're caught in the Shaharazad trap. Shahirah is hard. Was the queen in 1,001 nights who, who, who, who, whose turn it was to be consumed and, oh, sorry, consummated. And then, and then decapitated the sushi, as you know, the Kalief was a bit of a swine. And she decided that instead of making love, she'd start telling stories, newspapers. Now newspapers have always been caught in this, in this, in this dilemma. It's our job to, to, to make people want to buy us tomorrow as well. And so we're, we're very careful about the stories we tell we want them to be, right. Boy, we want to be varied. And I think the same is true.

Norman Swan (01:17:39):

The radio to jet, we wouldn't mind turning on occasionally. Nice. Yeah.

Susanna Elliot (01:17:45):

Do you have any really good tricks for, for getting scientists to be passionate so that you can ensure that people buy the papers or read the report next week or listen to them?

Tim Radford (01:17:55):

Well, I, I tell you that there's a certain selection. When you have a big pool of scientists, there's a selection process that goes on almost unconsciously. If you look at the British press, you will find that the same 20 or 30 scientists pop up over and over again, because they are the ones who understand the press and understand that, that answers it to be delivered in a sentence or two. And there are others who are keen to learn. And then, then there are those who actually end up writing for the press.

Norman Swan (01:18:23):

Digital editing is a wonderful thing. Okay.

Audience member (01:18:30):

Chairperson at the start raised the question of of problem of why there is so much more science communication, but so fewer people, so many less people going into science. Now, I would suggest that the reason for this is because scientists these days, they're part of the economic system. They have to scrounge for funds. And it's very important that they scrounge for funds. And often it means that they have, they spend a lot of time doing this and open. It means that they actually probably go too far or in terms of promising what they might be able to do. And I think as a result, also, there are, there are quite a lot of consequences. It means there's far too many people managing science. A lot of the money for sciences is not going into science. And a lot of exciting science is not being done because people can't afford to fail. I'd like to hear people's comments on that.

Norman Swan (01:19:23):

What goes against that is that my understanding is, and Tim can correct me, is that in the United States kids, aren't going into science either. And there's a lot more money in science. There there's plenty of money in science. There's no shortage really of money in science, in the United States. And so whilst it's, there's a sense of that in Australia, particularly in nonmedical research, medical research is much better funded than it used to be. Is that, that you're scrambling for money. I think it's more, the sense that kids have is that they actually want to earn a comfortable salary. You don't go into science, you go into law or finance. I think that's probably the stronger driver, Tim Radford (01:20:01):

The the chemistry departments and in particular physics departments in Britain are closing down at a rate so sickening that there won't be any in 10 years or so. And there will be no geophysicists in 15 years. This is an alarming report by by, by, by the current generation of professors, they look around and they don't have any students. So there are problems everywhere. I mean, I think the it's, it's quite clear that science is hard work. It's quite clear that there's not a secure profession. You can't, you can't say, well, I'll be a cited. It's just not up to you. You know, it's a research council that decide that and the, and the, and the budgetary constraints and the, the commercial companies that you might end up working for. So you can, you know, you can have a science degree and be beat the better and richer in every sense for it, except in monetary terms.

Manny Noakes (01:20:53):

So that being more visible can actually be an advantage rather than a disadvantage. I mean, just thinking of my own scenario being visible to the, to the community means you're actually more visible to your peers as well and provided that your name is not complete mud. You can actually that has some positive spin-offs. I mean, for example, in the last budget, we were provided with $2 million to develop some work in the children's area. Not because we'd already been working in the area, but because we had a high visibility and clearly we had some success with science communication. So it is possible to, to to use some of that communication to your advantage and particularly not, not necessarily to the more Orthodox funding bodies, such as the national health and medical research council but other industry groups and other groups in general who might seek to collaborate with you just because they know who you are.

Norman Swan (01:22:00):

And I told the one science course where there's no shortage of applicants is forensic science. So yeah, we've got CSR. I'm surprised we don't have CSI nor longer, but that's probably the only part in the globe. It doesn't have its own CSI program, but I mean, so it goes with what many things that role models and you see kids have attractive role models. You've got plenty of your legal programs, but you don't have many, you know, love over the test tube. You know,

Manny Noakes (01:22:32):

That's true with in nutrition. Not because of anything I've done, but in general, because people understand to some extent what, what it's about so they can connect with it. And in fact, to get into nutrition and dietetics at Flinders university, you have to have a have a score that is that surpasses what you would get to get into medicine just because not because you need it, but because it is so popular. So it, it can happen, I think, with other disciplines. And it's a matter of exposure and, and people seeing the relevance and having role models

Tim Radford (01:23:02):

That science had a science had a very bad press, the BSE crisis in Britain. It had an extremely bad press during the genetically modified food post crisis. However, when embryo stem cell therapy came, became a possibility some various Stute scientists actually, you might say flattered the press by enlisting their help. We were happy to help because here was a good story. You know Christopher Reeve might walk again, Muhammad Ali might actually get back into whatnot, get back on the rig, but at least recover from Parkinson's disease. We had a new therapy and with these tempting for us, a suggestion that it would never work at all, unless, unless we provided some kind of enthusiastic support for it. And well nobody's been cured of anything yet. And it may never be, but we did that. We, we, we were used as it were by by the scientific community to push through legislation, which would permit them to actually begin this quite difficult and ethically interesting research. So there's, there's, there's a lot, there's some, there's something in it for scientists as well. Politicians respond, politicians respond to public pressure, not the pressure from experts, you know, economists and lawyers and scientists could talk to them all. They're like actually politicians really, really they'll. They will buy what the public is interested in. So we can be used.

Susanna Elliot (01:24:39):

One quick question, a comment from John, and then we'll, we'll have time just for, for one or two very quick questions.

Dr. John Campbell (01:24:48):

Yes. I used to try and impress on my colleagues about all the students who are going in for accountancy and economics. And they're not doing that because they are excited about totting up figures and eligible, but they see a push and a lifestyle, and it's something science doesn't communicate. What do we have? We have traveled. We have all sorts of exciting places. Feel people get in their tactic, going back to the public perception of children. Rumor, when we were kids, every boy wanted to be a train driver or a policeman, and the girls wanted to be nurses. They all had role models about a sort of 20 years ago. There was a major change probably through television. They just want to be famous. Doesn't matter. What, and when the crime scene programs came out, kids were saying, oh, I want to be a crime scene investigator.

Dr. John Campbell (01:25:46):

Oh, fantastic. Now you go to university and do a BRC, and then you do another five years in recent history. Oh, bloody hell. I'm not fat around that long. Just want to be famous again. And I understand there are quite a few innovations tap into the, these things that briefly flared into interest. I mean, it's about as close to crime scene analysis as a real crime scene, no one gets in for a couple of days, as they please quietly work their way in the DNA characteristics clogged up for weeks. What do you see on television? They take this better thing back to the lab, drop it in this machine. And 10 seconds later, they know who they related to. So it's a right load of cobblers. And a lot of universities have got onto this. Well, people got excited about it and we'll have degrees in this. And I was told recently that the crime, the professional crime labs won't take those people. They want someone with a general train in science and chemistry. And so on.

Susanna Elliot (01:26:52):

Looks like we've got two more people would like to say something. And what I might do is get you both to ask your questions one after the other. And then we can answer both of them just for time. My name's Hillary,

Audience member (01:27:04):

And I'm a PhD student doing chemistry here, Adelaide. And I just wondered if you could give us your thoughts on the fact that here Adelaide university and many others. I imagine engineering students are required to do compulsory communications courses as part of their degrees or as science students. Aren't required to do these. And even if you are a science student, who'd like to do one of these, they're not available to you. And so I wondered if you thought we could and should be doing more things too at a university level to better prepare our future scientists for communicating with the media.

Susanna Elliot (01:27:34):

Okay. Second question.

Audience member (01:27:36):

Hi. my name's Corey and I work in the lab with Hilary. I'm also doing a PhD in chemistry and we often have a long coffees and discussions over these kinds of topics. But my was more of a comment rather than a question. I just thought everyone here is probably got an interest in science, but not everyone here is probably a science specialist. And for those people and the science specialists, there's an, a column in the Adelaide advertiser on Saturdays in the review section called, can you believe it? And a lot of people probably have read this, but my father is a panel beater. And he loves reading all the little comments about my supervisor who writes in there quite often. And I think John, you have an article on my correct this week today. So I just thought I'd make the note that there is some good science communication and apparently this column has been so popular. So it's just good to see that it is happening and peop the public do want it. And if a mainstream media would be only more willing to publish more of this, maybe people would find out a lot more about science and we'd overcome some of these I guess, misconceptions about science being boring.

Susanna Elliot (01:28:54):

I'm going to overcome my own rule and allow one last burning question, because he's putting his hand up for what, sorry about that.

Audience member (01:29:02):

It's a question we live and die by technology. We grow by science to the science communicators. Really understand the difference between between science and technology, the public, the public, certainly doesn't but do the communicators.

Dr. John Campbell (01:29:22):

Yes. [inaudible]. I think if you have a lot of TV programs in the last 20 years, they all have science in the title, but they're all about technology. They just want a whizzbang thing and they very seldom address a science question.

Norman Swan (01:29:43):

That's partly because making television science is really hard to do for pictures. And so things that go bump in the night or, you know flashlights are much easier to film. And and I think if you watched the evolution of capitalists on ABC television, they're really trying to take on that challenge of not making it a tomorrow's world or beyond 2000, which is just about dismal. And so it is an issue. There's no question about that. Coming back to that question about engineers getting concise communication and scientists, not engineers needed. [inaudible]

Tim Radford (01:30:24):

Very interesting that some scientists get a better, but some science says get a better press and better attention than others. It's true that it's much easier to write about and imagine, and, and enjoy stories about dinosaurs than it is say about molecular biology. Molecular biology is nearly always discussed in terms of the diseases that might be cured rather than the process of, of, of itself, because it's, as I say, hard to imagine Cory actually had a go at us yesterday about chemistry and the coverage of the British press and chemistry. And it is true that that's extremely bad. We can search the British press for the word polymer and you won't find it very often. And if you do, it'll usually be an a in an improper context. In fact, blood is a polymer, so his skin, so his bone we should be more, more at ease with these things, but things can be done.

Tim Radford (01:31:25):

One of the greatest writers of the last 50 years was a chemist. His name was Primo levy, and he wrote a book called the periodic table. And in fact, he wrote seven or eight books of which I would have thought the periodic table and his two Auschwitz memoirs will be with us for another hundred and 50 years or possibly 250 years. And they in particular, the periodic table has this remarkable quality of opinionating this, these hideous, uncertain concepts called words to a reality in a way that I've never actually seen before and still making it compelling and beautiful. So it can be done. It's, it's a challenge. In fact, it's a challenge I have always rather enjoyed. It's much more fun making stories that are difficult material, and it's not so much fun actually knocking with dinosaur tales is really seeing one dinosaur, seeing them all

Susanna Elliot (01:32:21):

One final comment from John Campbell. Before we wrap up

Dr. John Campbell (01:32:26):

The question about whether they should do a science communication course, sort of yes, but I have this loyalty to universities are because I think they are the cause of too much of the problems they have got to put out the school teachers who go out and enthused like missionary, zeal, love that, recommend that to anyone. And in my own subject physics, if you look at a physics exam answer sheet, you will see their page after page where there's never two words strung together. And unless we asked for this and the exams, like I used it, you show that it's not, you're not serious about this, and you don't need to communicate. In words, they ask a scientist one, they've got to respond to some question and 300 words, no formula or anything. And that's great training for scientists. And we should put that in their exams. I'd also

Manny Noakes (01:33:25):

Like to say that I think the notion of expanding the science curriculum at university level, that encompasses communication and a few other broader activities that would be of benefit to the student would possibly make science courses more attractive. And I think that that would be something to consider seriously as we struggle with a lack of people taking an interest in science.

Susanna Elliot (01:33:51):

Okay. And I'd like you all to join me in thanking our panelists.